**Verkada**

# User Guide for License Plate Recognition

# Overview

Verkada's license plate recognition (LPR) is a powerful feature that utilizes artificial intelligence and computer vision technology to identify and record license plate images in near real time, even at high vehicle speeds or in poor lighting conditions. Organizations can search for detected license plates based on partial or exact character matches and set up proactive alerts to notify specific users when license plates of interest are detected.

To ensure optimal performance and security, Verkada's LPR uses edge-based processing, with all computation taking place on the cameras themselves. This minimizes the feature's impact on bandwidth and ensures that all data, including video, images, and license plate information can be encrypted both in transit and at rest.[1]

To use LPR, no additional hardware or software licenses are required. This guide will provide an overview of key features and use cases, the user interface, and installation best practices to optimize system performance.

# Responsible Use

License plate recognition (LPR) technologies are used to automatically identify and record the license plate numbers of vehicles. These technologies can be used to observe the movements of individual vehicles and the people driving them, so it's important that you check with any laws and regulations that apply to your use of the technology to make sure you comply with those laws.

# Compatible Cameras

The Verkada Bullet series and Remote series cameras are the only models that support license plate recognition (LPR). These include the CB52-E and CB62-E wide-angle bullet cameras, the CB52-TE and CB62-TE telephoto bullet models, and the CR63-E remote camera with LTE. Telephoto bullets are specifically designed for capturing license plates from far away, while wide-angle bullets can also support LPR but only at shorter distances. The CR63-E is capable of capturing plates at standard distances with zoom capabilities that fall between those of telephoto and wide-angle bullets.

Note that people and vehicle analytics are disabled when a camera is in LPR mode. Additionally, because of the angle and optical zoom required for successful LPR deployments, cameras capturing license plates may struggle to effectively monitor a wide area. Organizations have the option to pair a context camera with a camera in LPR mode to capture the entire vehicle and its surroundings.

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1. Data on device is encrypted at rest using AES-128. Data in the cloud is encrypted at rest using AES-256. Data in transit to the cloud is encrypted using TLS 1.2 or greater.
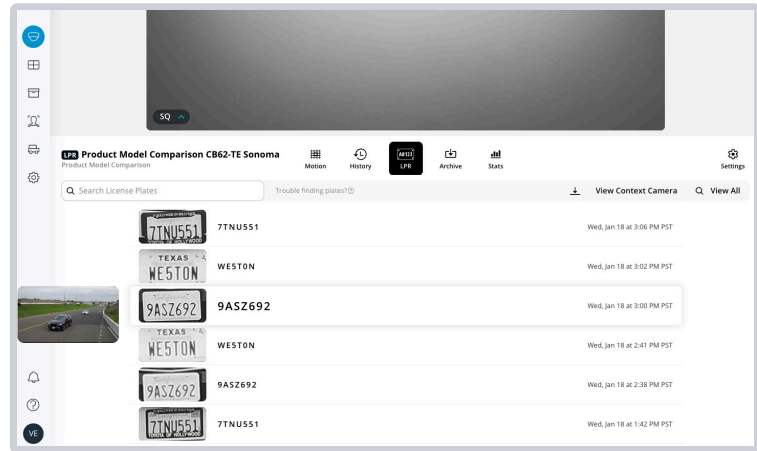
# Key Features

## Search for specific vehicles

LPR can be used to search for historical appearances of a license plate. Quickly identify vehicles of interest and gain insights into historical movements.



## Receive alerts for license plates of interest

Upload a list of known vehicles or add license plates of interest one by one. Designate specific recipients to receive notifications any time a designated plate is seen on camera.
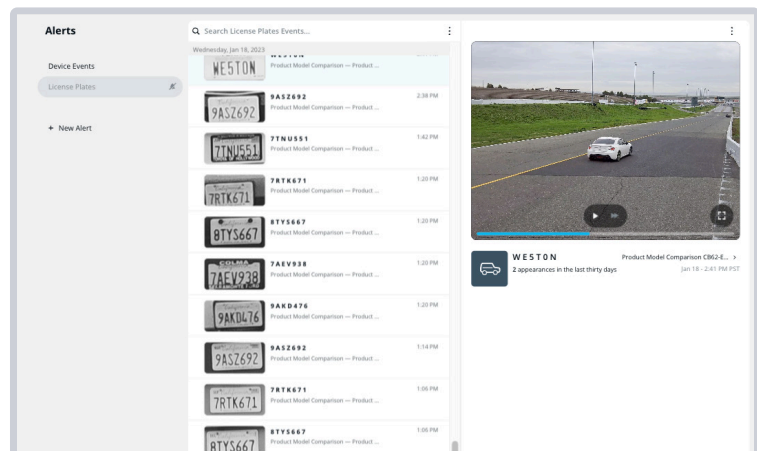


## Use APIs to import and export data

Integrate with third-party systems using Verkada's API. Automatically import vehicle hotlists or export reports of vehicles entering and exiting a parking lot.
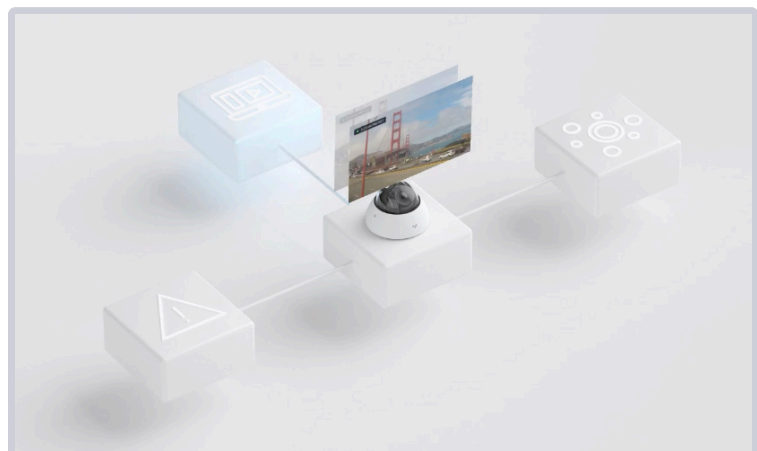
# Key Use Cases

Verkada's LPR solution has been designed to recognize license plates accurately and reliably, even on vehicles traveling at high speeds of up to 80 mph / 128 kph and across multiple lanes.

**Access control vehicle gates**

Combine LPR functionality with Verkada's access control solution to provide seamless entry to known vehicles – no badge or PIN code required.



**Identify stolen or wanted vehicles**

Upload hotlists and receive proactive notifications when a vehicle of interest is spotted. Protect facilities from stolen vehicles, wanted criminals, and known shoplifters.



**Protect your parking lots**

Keep track of vehicles entering and exiting parking lots. Respond more effectively to hit-and-run incidents and car burglaries.

# Frequently Asked Questions

**Will first-generation bullet cameras provide the same level of license plate recognition (LPR) performance as the current, second-generation models?**

No, the second-generation Bullet cameras (CB52-E, CB52-TE, CB62-E, CB62-TE) are equipped with a more advanced system on a chip (SOC) and a dedicated computer vision co-processor that supports an improved LPR algorithm, resulting in better license plate character detection. The second-generation cameras can capture license plates from vehicles traveling at speeds of up to 80 mph / 128 kph, compared to the 25 mph / 40 kph capability of first-generation models (CB51-E, CB51-TE, CB61-E, CB61-TE). Additionally, the second-generation bullet cameras can support LPR across up to three lanes, while the first-generation models can only support a single lane.

**Is it possible to use cameras in LPR mode for video security beyond just license plate recognition?**

Yes, cameras in LPR mode also operate as regular Verkada security cameras. Cameras in LPR mode are still recording footage 24/7 in adaptive quality. This allows customers to review history, perform motion searches, and create archives. Both security footage and captured license plates will be available for the retention period of the camera.

However, it's worth noting that Verkada's people and vehicle analytics features are disabled when the camera is in LPR mode.

**Is it necessary to use a bullet or remote camera as the context camera in a dual-camera LPR setup?**

No, any camera in Command can be used as a context camera as long as it is not in LPR mode. You have the flexibility to choose the camera that best suits your needs and preferences.

**What is the function of a context camera and when is it necessary to use one?**

When using LPR, it is recommended to focus on 1-3 lanes so that passing vehicles take up most of the frame as they pass through the scene. LPR cameras also operate in the infrared range of the light spectrum instead of visible range. This is because license plates are highly reflective for infrared light and are designed to be read in that spectrum.

A customer may want to also monitor the scene while using LPR cameras. In this case, a context camera can be used to provide a broader view without compromising the LPR's performance. Context cameras are also useful for general security purposes and capturing balanced contrast color footage to better investigate observed vehicles.

**When is it necessary to use an external IR illuminator for capturing license plates and what model should I choose?**

If the location where license plates will be captured is in a low-light or distant area, it is highly recommended to use an external IR illuminator to enhance the visibility of the license plates. Contact a Verkada Sales Representative for recommendations on which 3rd party product to use.

**Is it possible to integrate a Verkada LPR camera into an external system, such as a tolling system?**

Yes, Verkada offers APIs for accessing license plate data. If you would like to integrate a Verkada LPR camera with an external system, please reach out to our solutions engineering team to see if we can support your specific use case.

**What types of license plates are incompatible with Verkada's LPR technology?**

Our LPR system is only designed to recognize license plates with Latin characters and does not support license plates with three or fewer characters.

# LPR Page in Command

Using Command, Verkada's web-based management platform, users can access their LPR cameras and view real-time and historical footage of vehicles.



| | A | B | C | D |
|---|---|---|---|---|
| | Accessing LPR from Command | Translated license plate | Plate sightings | Context camera feed |

| | E | | F | |
|---|---|---|---|---|
| | License plate search | | CSV export | |

# User Experience
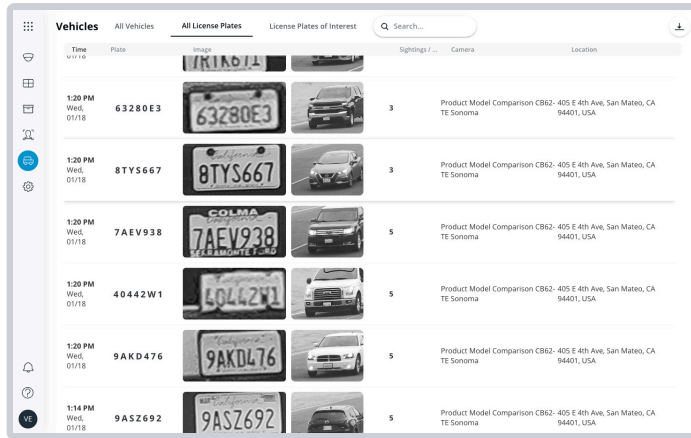


**Monitor in real time**

View live plate detection across your organization
from the LPR page in Command
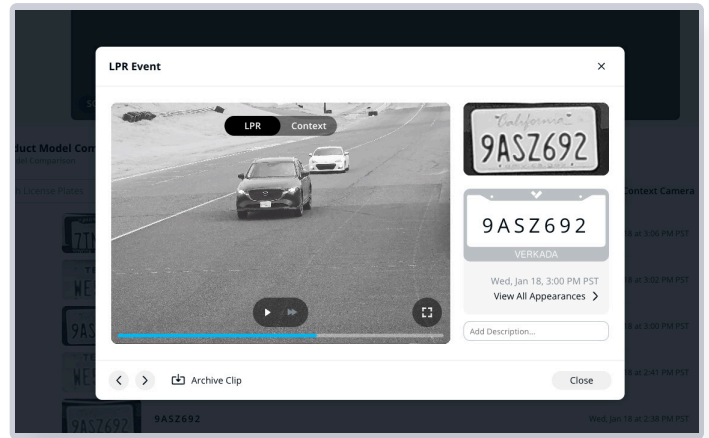


**Switch viewing modes**

Toggle between LPR and context views
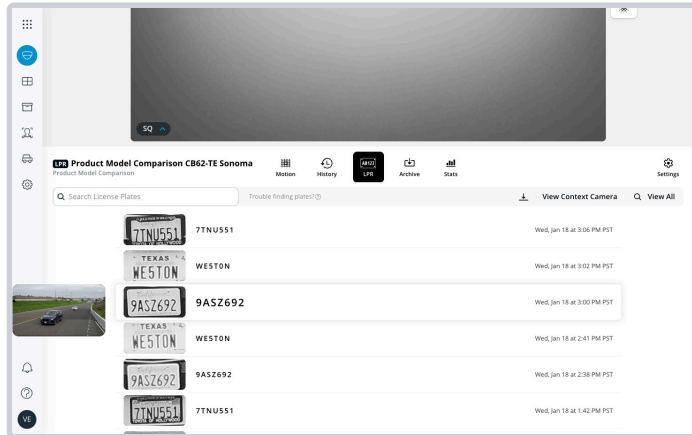


**Search plates**

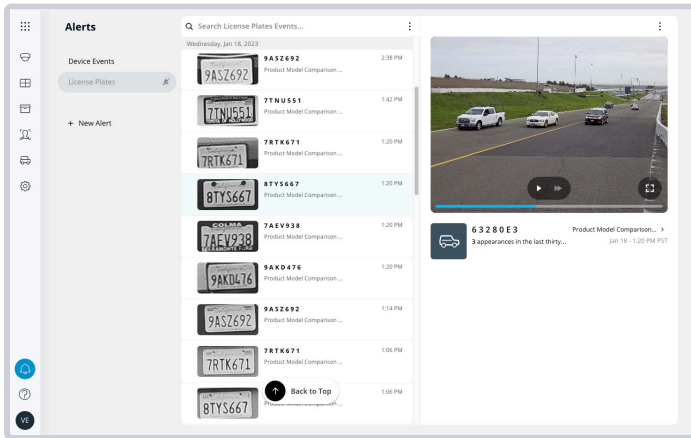LPR Cameras detect and read plates,
making them searchable
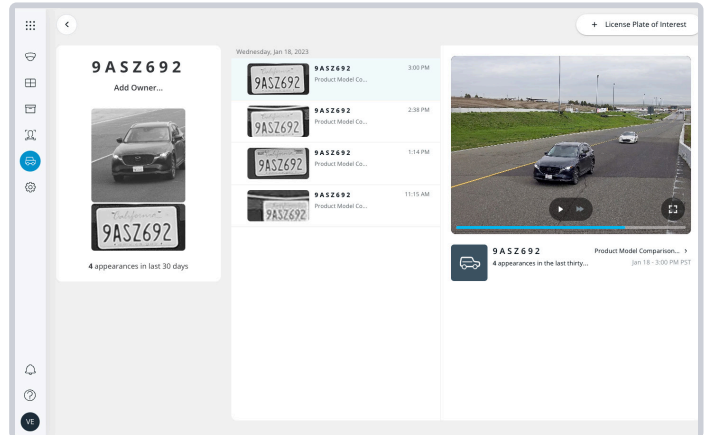


**Investigate events**

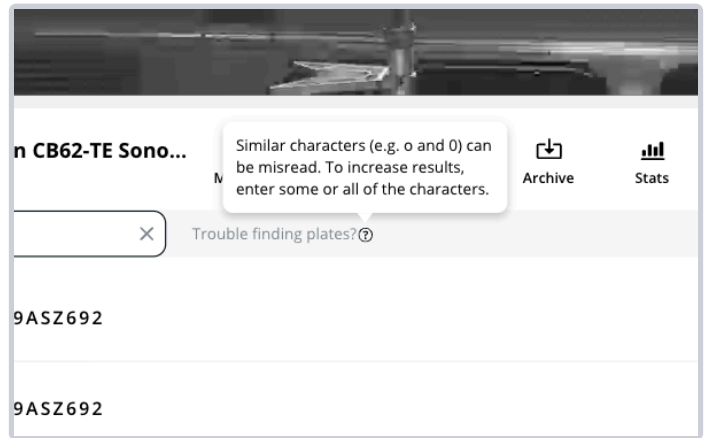See how events unfold and access
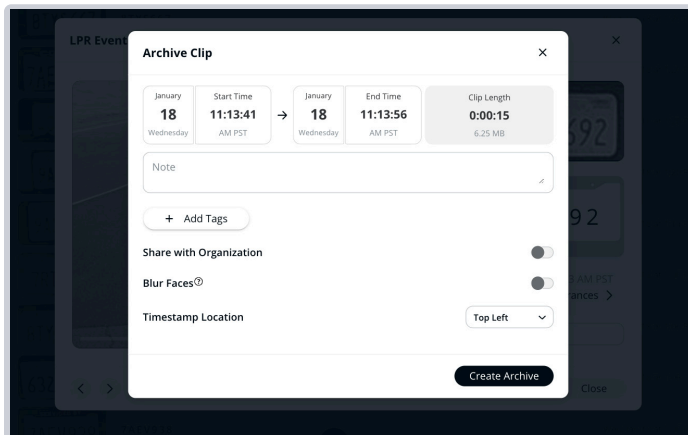archived footage from the LPR page

# User Experience



### Get alerts

Get notified when a specific plate is detected at any of your locations



### Expand results

Get more comprehensive search results through approximate license plate matches



### Archive footage

Archive clips, add descriptions and view all appearances of the plate



### Export results

Create custom reports or integrate with other security systems using Verkada's API
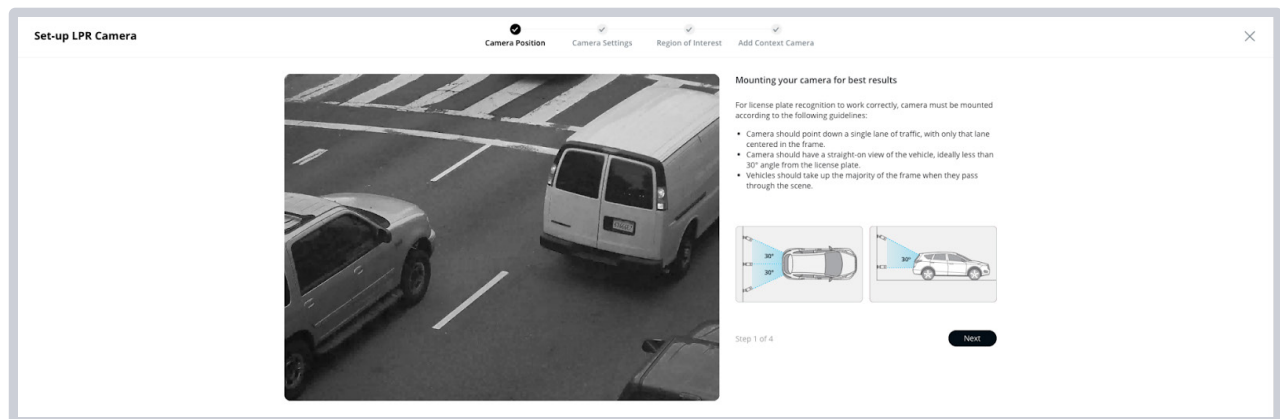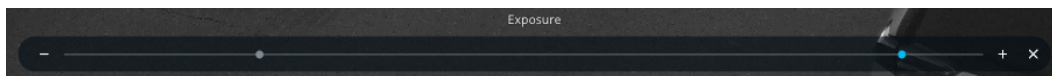
# Installation Guidance

Before installing your LPR Camera, consider the following:

- To ensure optimal license plate detection with the CB52-E, CB62-E, and CR63-E cameras, it is recommended that vehicles be within 14m / 46ft of the camera. However, it is possible to detect license plate details from up to 20m / 66ft away or further.
- To ensure optimal license plate detection with the CB52-TE and CB62-TE cameras, it is recommended that vehicles be within 35m / 115ft of the camera. However, it is possible to detect license plate details from up to 50m / 164ft away or further.
- If the area where license plates will be captured is far away and not well lit, it is strongly recommended to use an external IR illuminator to improve the visibility of the license plates.

To install your LPR camera, follow these steps:

## 1. Position the camera

- Ensure the camera is upright and is not rotated at 90°, 180°, or 270°.
- Aim the camera towards the desired traffic area, such as a garage entrance or drive-through lane. CB52-E/TE and CB62-E/TE cameras have the ability to monitor up to three lanes. The CR63-E is capable of monitoring up to two lanes. CB61-E/TE and CB51-E/TE cameras can monitor one lane.
- For optimal results, position the camera so that it has a direct, unobstructed view of the vehicle with an angle of less than 30° vertically or horizontally from the license plate. It is acceptable to have a larger angle for lower speeds (e.g. 45° for parking lot deployments) and recommended to have a smaller angle for fast speeds (e.g. 15° for highway deployments). The camera may still be able to capture adequate images outside of these angles, but with a lesser degree of accuracy.
- Avoid installing the camera at a parallel angle to the horizon facing east or west, as the glare of a sunrise or sunset may obstruct the ability to capture license plate details.
- If changing lighting conditions cause overexposure of the license plate, use the exposure slider to fix it. Overexposure may impact the camera's ability to accurately capture license plate details.





**Balanced exposure**
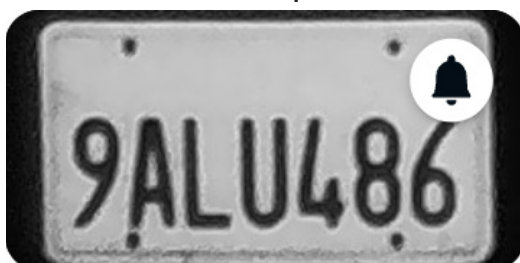
**Overexposure**
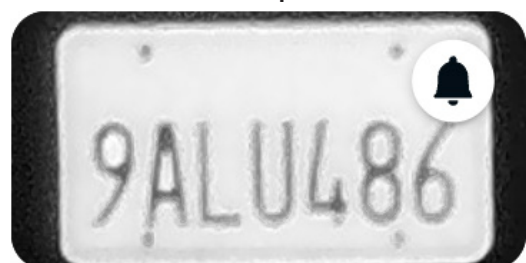
# Installation Guidance

## 2. Adjust the focus and zoom

- Use the built-in focus and optical zoom features to adjust the camera's field of view so that passing vehicles take up most of the frame as they pass through the scene.
- Ensure that the license plates of passing vehicles are in focus as they move into the scene.
- To get the best focus when using autofocus, consider these tips:
  a. Choose a point in the frame with high contrast. Edges of objects or lines usually have pronounced light and dark areas, which can help achieve a sharper image.
  b. Make sure the focus point is at an appropriate distance, such as the distance at which you will be capturing license plate details.
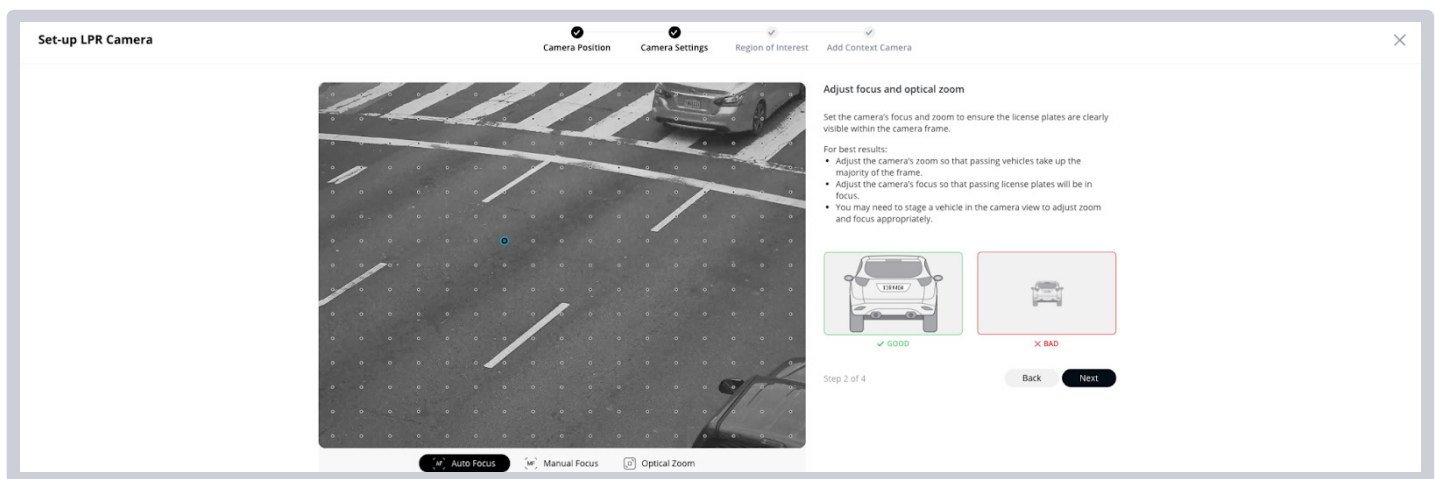


**Good focus point**
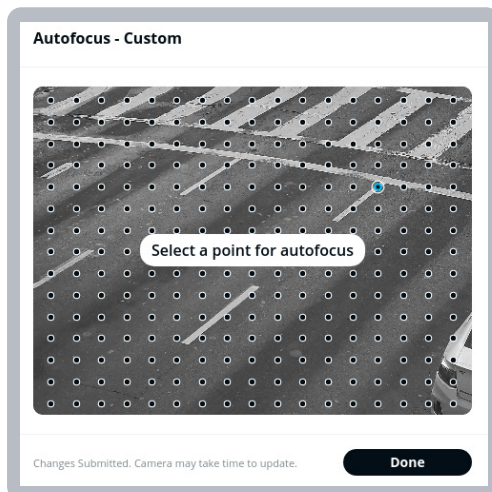


**Poor focus point**
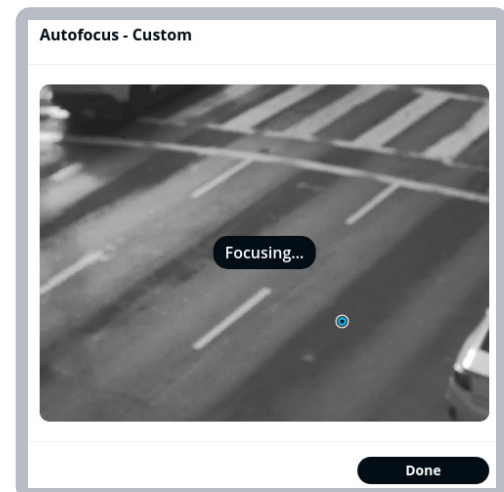
# Installation Guidance

## 3. Optional step: select the region of interest for the license plate

- Using the grid, highlight the area where license plates are most likely to pass.
- The highlighted area should be as large as possible and should not be obstructed or include other objects with text, such as road signs or construction signs. If the highlighted area includes road signs, use the privacy regions feature to block them out.

**This step is necessary in the following situations:**

1. The user wants to only perform LPR on certain lanes or regions.
2. The user wants to remove distractions such as the footpath, but does not want to use the privacy region feature.
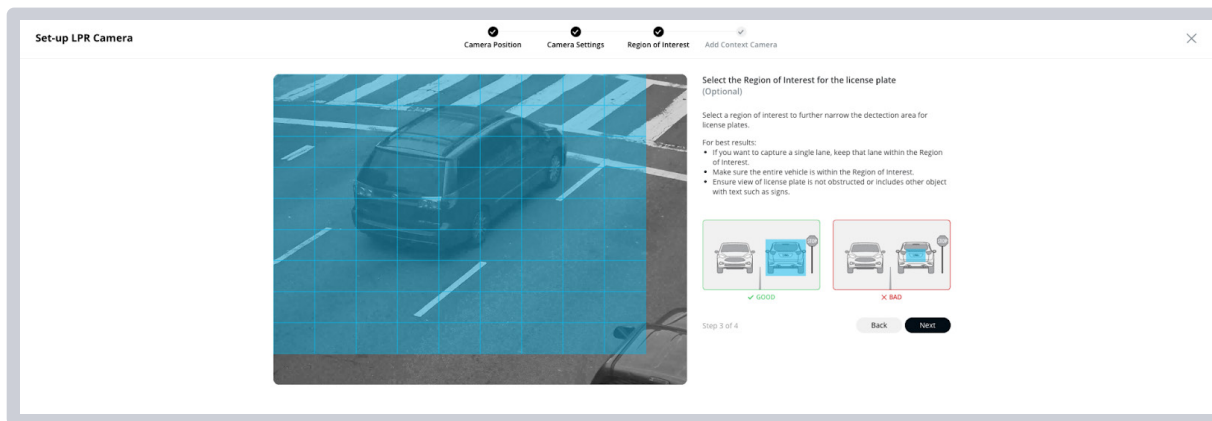3. The camera is installed at an almost parallel angle to the horizon, and the user wants to focus on license plates that are closer to the camera rather than those further away.



## 4. Optional step: add a context camera

- Select a nearby context camera to capture a wider field of view and provide more detail around vehicle events. The context camera should be looking at the same region as the LPR camera, so that the footage for both cameras can be synced.

**This step is necessary in the following situations:**

1. The user wants to use vehicle analytics features.
2. The user wants to capture a wider view and color footage of the area being observed by the LPR camera.
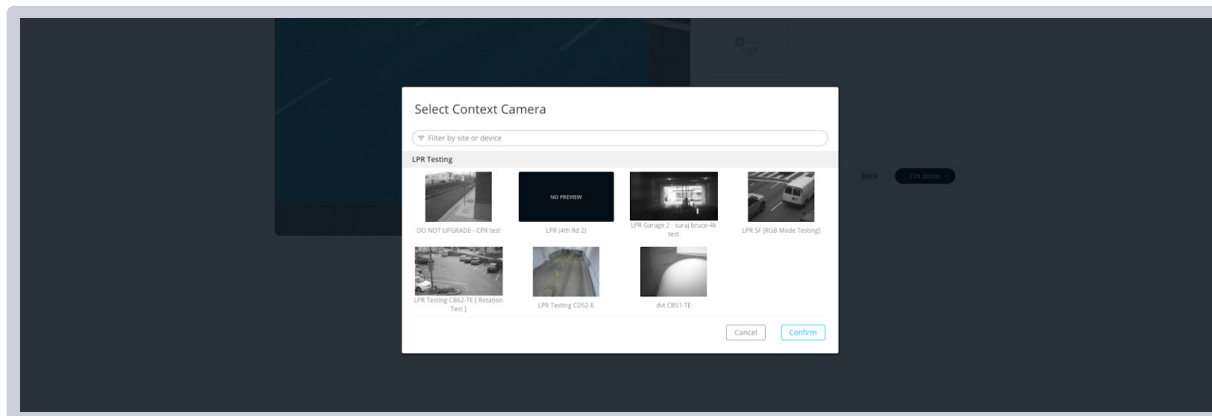


Note that even if Verkada LPR cameras are not installed in the best way, they may still be able to capture license plate details accurately. While these installation instructions are intended to help you get the most comprehensive and clear results, it is still possible to achieve high-quality results even if you are unable to follow these recommendations exactly.

# Use-Case-Specific Considerations

### Intersections

- Place LPR cameras at all entrances or exits to the intersection. Position the cameras to observe the lanes near the corner where the camera is installed, rather than across the intersection to capture plates on the opposite side.
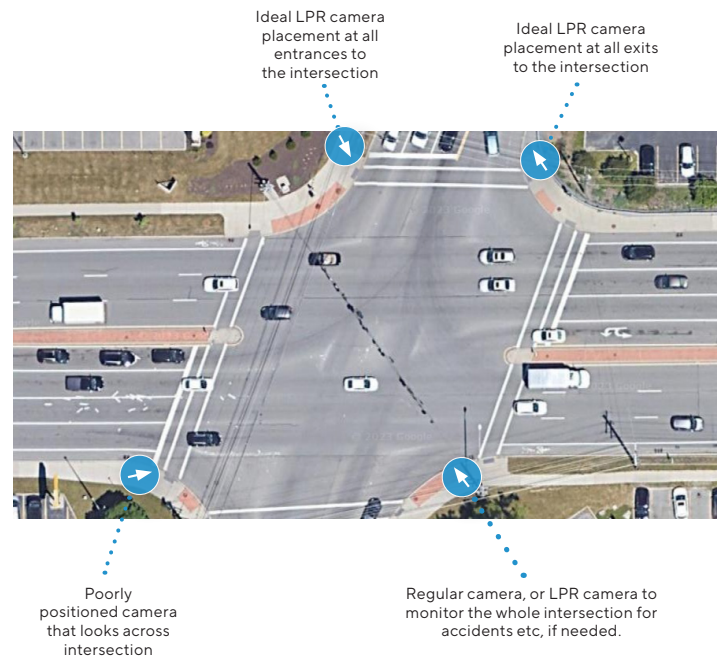- It is recommended to point the cameras towards the back license plates, as some jurisdictions do not require vehicles to have front plates.
- Verkada's solution only requires four LPR cameras per intersection, as they can cover up to three lanes. Other solutions may require one camera per lane, potentially requiring up to 12 or more cameras.



Ideal LPR camera placement at all entrances to the intersection

Ideal LPR camera placement at all exits to the intersection

Poorly positioned camera that looks across intersection

Regular camera, or LPR camera to monitor the whole intersection for accidents etc, if needed.

### Highways

- To get the most accurate results for high-speed vehicle observations (e.g. 80-128 km/h or 50-80 mph), it is best to have head-on shots of the license plates. To achieve this, it is recommended to install the camera at a smaller angle (e.g. 15°) that is more parallel to the road.
- For the best results, mount the camera at a point where the license plates are unlikely to be occluded by other vehicles or details in the scene. For example, a camera mounted on an overpass or highway sign should have clear visibility across all lanes. A camera mounted on the side of the highway at a low angle may occasionally miss a vehicle if another vehicle in a closer lane causes occlusion.



### Parking lots

- If you expect a lot of parked cars in the scene and cannot zoom in further, set the region of interest along the driving paths and try to exclude the parking spots where cars remain stationary.
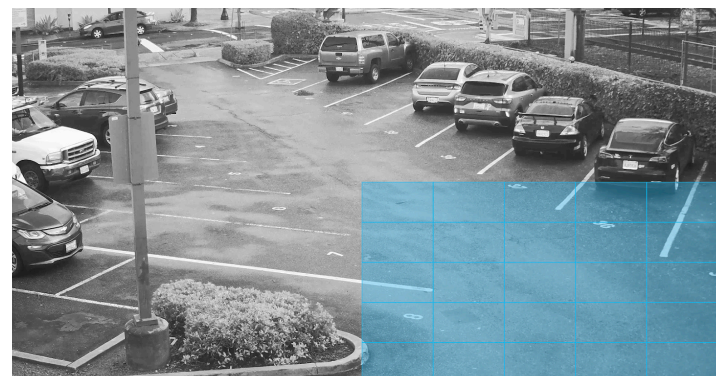
# Enabling LPR Mode

To enable LPR on your compatible Verkada camera, follow these steps:

1. Navigate to the device settings page.
2. Click on or scroll down to the "Analytics" section.
3. Locate the "License Plate Recognition (LPR) Mode" setting.
4. Click "Enable."
5. Follow the setup steps outlined.

Please note that enabling LPR mode will initiate a firmware update that could take up to five minutes to complete.

# Examples of Good LPR Results



# Availability by Country

Verkada's LPR solution has been tested and is currently recommended for use in the following countries:

| Jurisdiction | License Plate Recognition | License Plate of Interest alerts |
|---|---|---|
| United States | ✓ | ✓ |
| United Kingdom | ✓ | ✓ |
| Australia | ✓ | ✓ |
| European Union | ✓ | ✓ |

# Ordering Information

## Bullet Series[2]

| Model Number | MP[1] | WDR | Lens | IR Range | Onboard Storage | Maximum SQ Onboard Retention[1] | People/ Vehicle Analytics | Cost (MSRP) [USD] |
|---|---|---|---|---|---|---|---|---|
| CB52-256E-HW | 5MP | ✓ | Zoom | 30m / 98ft | 256GB | 30 Days | ✓ | $1,599 |
| CB52-512E-HW | 5MP | ✓ | Zoom | 30m / 98ft | 512GB | 60 Days | ✓ | $1,999 |
| CB52-768E-HW | 5MP | ✓ | Zoom | 30m / 98ft | 768GB | 90 Days | ✓ | $2,399 |
| CB52-2TBE-HW | 5MP | ✓ | Zoom | 30m / 98ft | 2TB | 365 Days | ✓ | $4,099 |
| CB62-512E-HW | 4K | ✓ | Zoom | 30m / 98ft | 512GB | 30 Days | ✓ | $1,999 |
| CB62-1TBE-HW | 4K | ✓ | Zoom | 30m / 98ft | 1TB | 60 Days | ✓ | $2,799 |
| CB62-2TBE-HW | 4K | ✓ | Zoom | 30m / 98ft | 2TB | 90 Days | ✓ | $4,099 |

## Telephoto Bullet Series[2]

| Model Number | MP[1] | WDR | Lens | IR Range | Onboard Storage | Maximum SQ Onboard Retention[1] | People/ Vehicle Analytics | Cost (MSRP) [USD] |
|---|---|---|---|---|---|---|---|---|
| CB52-256TE-HW | 5MP | ✓ | Zoom | 50m / 164ft | 256GB | 30 Days | ✓ | $1,799 |
| CB52-512TE-HW | 5MP | ✓ | Zoom | 50m / 164ft | 512GB | 60 Days | ✓ | $2,199 |
| CB52-768TE-HW | 5MP | ✓ | Zoom | 50m / 164ft | 768GB | 90 Days | ✓ | $2,599 |
| CB52-2TBTE-HW | 5MP | ✓ | Zoom | 50m / 164ft | 2TB | 365 Days | ✓ | $4,299 |
| CB62-512TE-HW | 4K | ✓ | Zoom | 50m / 164ft | 512GB | 30 Days | ✓ | $2,199 |
| CB62-1TBTE-HW | 4K | ✓ | Zoom | 50m / 164ft | 1TB | 60 Days | ✓ | $2,999 |
| CB62-2TBTE-HW | 4K | ✓ | Zoom | 50m / 164ft | 2TB | 90 Days | ✓ | $4,299 |

1. All our cameras record in "adaptive quality," capturing both standard and high quality streams. Standard quality (SQ) video is stored up to the amount of retention specified by the customer. The amount of high quality video stored on the camera will depend on the amount of motion detected by the camera over time. To learn more, visit our website: https://docs.verkada.com/docs/adaptive-quality-recording-whitepaper.pdf
2. Government-grade variants of certain camera models are also available. See https://docs.verkada.com/docs/FIPS-validated-series.pdf for details.

# Ordering Information

## Remote Series

| Model Number | MP[1] | WDR | Lens | IR Range | Onboard Storage | Maximum SQ Onboard Retention[1] | People/ Vehicle Analytics | Cost (MSRP) USD |
|---|---|---|---|---|---|---|---|---|
| CR63-512E-HW | 4K | ✓ | Zoom | 30m / 98ft | 512GB | 30 Days | ✓ | $3,499 |
| CR63-1TBE-HW | 4K | ✓ | Zoom | 30m / 98ft | 1TB | 60 Days | ✓ | $4,299 |
| CR63-2TBE-HW | 4K | ✓ | Zoom | 30m / 98ft | 2TB | 90 Days | ✓ | $5,399 |
| CR63-3TBE-HW | 4K | ✓ | Zoom | 30m / 98ft | 3TB | 120 Days | ✓ | $6,699 |

1. All our cameras record in "adaptive quality," capturing both standard and high quality streams. Standard quality (SQ) video is stored up to the amount of retention specified by the customer. The amount of high quality video stored on the camera will depend on the amount of motion detected by the camera over time. To learn more, visit our website: https://docs.verkada.com/docs/adaptive-quality-recording-whitepaper.pdf